CHARGE NO: 1702

PROJECT TITLE: FILTRATION PHYSICS

PROJECT LEADER: R. W. Dwyer

PERIOD COVERED: July 1-31, 1980

DATE OF REPORT: August 6, 1980

I. FILTER DESIGN

A. FILTER EFFICIENCIES (1,2)

The filtration-efficiency studies have been extended to an aerosol flow rate of 5000 cc/min for 2.1/60K cellulose acetate filters. These data show that the efficiency increases in the range of 1300 to 5000 cc/min, suggesting that the inertial removal mechanism makes a significant contribution at these flow rates. Preliminary experiments with a 2.5/48K tow show a similar dependence of efficiency on aerosol velocity.

B. DESIGN MODELLING (3,4)

A report was issued on the effects of design on flow through ventilated cigarettes. Further work has been performed on refining the filtration-efficiency section of the model in an attempt to predict puff-by-puff TPM deliveries at elevated flow rates.

C. NOVEL FILTER DESIGNS (5,2)

The Flavor Development Panel subjectively evaluated our hollow-tipped filter cigarettes compared to untipped controls. The prototype filter was designed to provide more TPM than the control at the early puffs, and less at the later puffs. The Panel found no subjective advantage at the 5 mg level. The C.I. puff-by-puff analysis of these cigarettes has not yet been received.

FTC tar results have been obtained from C.I. on our filter by-pass samples. These cigarettes are being redesigned to give deliveries comparable to unmodified controls.

A program has been initiated to determine the effects of dilution on the deliveries and filtration efficiencies of non-standard, commercially available cigarette filters. Baseline results for Merit 85's have been received, and

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samples of True, Kent III, and L & M Flavor Lights are being prepared.

II. AEROSOL CONTROL

A. FILTRATION EFFECTS (6,7,8)

A report was issued on the effects of puff velocity, rod lengths, and filters on smoke formation and particle size. A thorough investigation of the influence of rod length and aerosol flow rate on the efficiency of Marlboro tobacco rods is under way. In this study, the efficiency of the tobacco bed in selectively removing particles of a specific size is being examined.

A dual-wavelength light-extinction apparatus has been constructed and made operable. This instrument will be used to determine the feasibility of monitoring the particle size changes in smoke exiting the filter during a two-second puff.

B. PARTICLE SIZE ANALYSIS (9)

A Sierra Instruments Cascade Impactor arrived this month. This device should allow us to achieve higher resolution in the particle size analysis of smoke aerosols. Currently, the impactor is being calibrated.

C. REFRACTIVE INDEX ANALYSIS (10)

A report was issued on the refractive index of cigarette smoke.

REFERENCES

R.W. Dwyer

1) S. G. Abel, Notebook 7516.
2) R. Tyson, Notebook 7543.
3) R. W. Dwyer, Notebook 7327.
4) R. W. Dwyer, S. G. Abel, M. L. Fleming, special report, "The Effects of Design on Flow through Ventilated Cigarettes," A.N. 80-172, 7/2/80.
5) M. L. Fleming, Notebook 7342.
6) R. M. Creamer, Notebook 7237.
7) D. M. Puzio, Notebook 7553.
8) R. M. Creamer, special report, "The Effects of Puff Velocity, Rod Length, and Filters on Smoke Formation and Particle Size," A. N. 80-183, 7/20/80.
9) D. D. McRae, Notebook 7330.
10) D. D. McRae, special report, "The Refractive Index of Cigarette Smoke," A.N. 80-190, 7/17/80.

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